

# Digital Books & The Future of Information

Trevor Phillippi

At the software development company I've worked at while in school at RPI, on a small bookshelf in the office is a book titled "Modern Operating Systems". Published in 1991, this book in 2014 served now as a window into the past of what operating systems once were, even though its intent was to acclimate the reader to the then current state of affairs. This irony led me to ponder the 21st century use of printed materials for educational and technical information. Not only are books actually a terrible interface for learning, but their perpetuation causes environmental harm. The bright spot in all of this, is that the explosion of tablet and smartphone growth has led to much increased e-book sales which will likely lead to the decline of printing altogether. But more has to be done, and can be, quite easily.

Additionally, as children grow up using today's computers, tablets, and smartphones, using traditional books for learning is a discordant and cumbersome experience. Opting for printed over digital books ignores many objective advantages of digital over printed books. Digital books allow readers to look up unknown terms or additional information in the same context they are reading the book, this allows for increased reading comprehension and engagement of the material. Additionally, digital information can be read aloud of "readers" to understand pronunciation and cadence, or for general reading comfort as a break from non-verbal reading. Typography on digital books can adapt to suit the reader's vision or preference needs, which is important because children read very differently than young adults or adults. Readers can highlight and annotate their text in the context of the book without risking losing it, and it does not destroy the source material. Lastly and perhaps most importantly, digital text is indexed by nature, so no need to turn to the back of the book for important terms, which makes the book much easier to reference. All of these things increase engagement with the material and open the doors for instructors to actually have more insight into, and verification of, students reading habits.

These human factors benefits highlight the practicality of opting for digital over printed books, especially in educational or technical contexts, but there are also environmental reasons. As "e-reader" usage increases, it saves about 3 billion KG of CO2 emissions yearly, and those numbers are outdated and likely growing (Ritsch, "The Environmental Impact Of Amazon's Kindle"). Tablets and e-readers have a 160-200 KG carbon footprint for device, but the majority of that is in the manufacture of the device, not its usage. The more usage these devices get, the more economical they are financially and environmentally. 75% of the publishing industry's carbon footprint is due to the 125 million trees they cut down annually, so switching them away from paper books would allow them to continue to operate but dramatically reduce their impact. Additionally, 26% of all landfills are paper waste. As the biggest user of industrial water, the printing industry produces about 153 billion gallons of wastewater annually. There are serious concerns about contamination from this, especially in poorer areas.

It's quite clear that we ought to switch away from paper books, but it's not enough for individual consumers to alter their buying habits, the whole industry has to change, and I feel it starts with education. First, educational institutions have to put pressure on the publishing industry, and second and most importantly, I think we need a complete reimagining of books in the digital age.

The cost of textbooks has risen 812% since 1978 (Weissmann, *The Atlantic*), dramatically exceeding the increase in medical care and home prices both of which saw huge increases over the same period. Textbook publishing companies have numbers of malpractices to keep profits high, including the bundling of superfluous and horrible software with only new versions to prevent resale of books, and "revision roadmaps" that ensure that subsequent versions of a given textbook are difficult to use in concert with older ones. Instructors assign these texts indiscriminately, and this makes keeping up with classes even less affordable, assuming instructors actually use the texts they assign, which often isn't the case. I would call on all educational institutions to put pressure on the publishing industry by no longer promoting the sale of printed books, and requiring all texts be digital. This ensures that \$250 dollar textbooks students purchase don't become obsolete overnight, but driving the cost down and adding the human factors benefits of digital books. Additionally, institutions should require that book publishers use an actual ebook standard as opposed to proprietary software with horrible usability and OS compatibility.

I also feel as a whole we need to rethink digital information. Transferring books directly to digital mediums ignores all of the exciting new possibilities afforded by current technology. Diagrams and charts in books spring to life as animations that tell a more complete story of microbiology or economics, and singular paintings become slideshows in art history books. Today, commercial multimedia engages us in ways that antiquates forms of learning fail to. As much as we all get nostalgic about books, they are a static medium that stands in stark contrast to how we spend our leisure time consuming information and content. The previous points are only about multimedia; the actual texts of books needs to be freed from its silo and join the rest of the web.

In 1945, Vannevar Bush wrote an article in *The Atlantic* titled "As We May Think", proposing what he called the Memex, which was a comprehensive record of all knowledge and research, linked together and complete with personal annotations. We finally have the means to produce such an innovation, and it essentially already exists with the World Wide Web. Links lead to other pages full of searchable text, but there are still problems that I see. First, the text must be copied in order to be quoted. I imagine a future more like the way low-level memory works in a computer, where text is not referenced but pointed to, this way information is always up to date and citation is hardly needed as the source material is displayed in the context it's quoted in. Twitter already does this with embedding "cards", but we need equivalents for higher quality pieces of information. And secondly, we need books to join the rest of the web, along with scholarly journal articles. Books antiquated format allows for the exploitation that publishing companies do of creating new editions rendering old ones absolute. Making books more like web pages

or apps allows them to be updated unobtrusively and ideally for free. This means citations are always up to date as the information changes.

I've barely scratched the surface of where technology could and should go in the future, but the concrete actions that should be taken are consumers start buying digital media when it comes to technical and educational material. I appreciate the nostalgia and beauty of a well printed and typeset book, so I would like to see them continue, but for novels and visual books that are enhanced by tactile books. I also would like to see education embrace new media, as doing so would create better and more affordable learning experiences for students, and help bring an end to unethical economies, while simultaneously helping with our carbon footprint and unnecessary deforestation and excess wastewater.

## Bibliography

[http://www.tkearth.com/downloads/thoughts\\_ereaders.pdf](http://www.tkearth.com/downloads/thoughts_ereaders.pdf)

<http://www.theatlantic.com/business/archive/2013/01/why-are-college-textbooks-so-absurdly-expensive/266801/>

<http://mic.com/articles/62685/an-inside-look-at-the-textbook-scam-sweeping-college-campuses>

<http://www.starhop.com/library/pdf/studyguide/high/brsp-17ReduceCO2.pdf>

<http://www.triplepundit.com/2012/01/amazons-kindle-reports-biggest-sales-green/>

[http://www.nytimes.com/2012/11/01/education/technology-is-changing-how-students-learn-teachers-say.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2012/11/01/education/technology-is-changing-how-students-learn-teachers-say.html?pagewanted=all&_r=0)

[http://blogs.edweek.org/edweek/education\\_futures/2014/01/4\\_ways\\_digital\\_technology\\_has\\_changed\\_k-12\\_learning.html](http://blogs.edweek.org/edweek/education_futures/2014/01/4_ways_digital_technology_has_changed_k-12_learning.html)

<http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/>

## Full Citations

1. Bush, Vannevar. "As We May Think." The Atlantic. Atlantic Media Company, 01 July 1945. Web. 01 Dec. 2014.
  2. Vannevar Bush was an engineer and head of the U.S. Office of Scientific Research and Development during World War II, making major contributions to science and technology during that time.
  3. The main argument of the text is that current (1945 at the time) research and information had become too unwieldy for researchers to consume and reference, and that this pushed specialization even further and erected walls between disciplines. He proposed a new way of containing, referencing and annotating information.
  4. First, Bush explains that in the post war era humanity must turn towards positive innovation in contrast to the deadly innovation of the preceding decade. He then describes the problem that researchers face with managing their information and reading others, and proposes his solution, which in retrospect we see could never be, as he proposed intricate systems of lenses and microfilms. The technology we possess today more affords the innovations he describes.
  5. The difficulty seems to be, not so much that we publish unduly in view of the extent and variety of present day interests, but rather that publication has been extended far beyond our present ability to make real use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships. Professionally our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose. If the aggregate time spent in writing scholarly works and in reading them could be evaluated, the ratio between these amounts of time might well be startling.
  6. This work supports my argument as it lays a theoretical framework for the type of thinking that will go on to replace our current reliance on books as reference material.
  7. Specifically, I used his rationale about how the huge amounts of information we have are unnavigable and I also was influenced by his notes on personal annotations being part of the Memex.
- 
1. Ritsch, Emma. "The Environmental Impact Of Amazon's Kindle." Cleantech, LLC. Web. Mar. 2009.
  2. Cleantech, LLC. is a company focused on helping startups with sustainable technological innovation. They published this document independently advocating for more conscientious technological usage for startups.

3. The main argument of the text is that e-readers and tablets have net gains for the carbon footprint of American society but that the publishing industry must respond to these new market trends before any real change is affected.
4. The argument is fleshed out by first explaining the environmental harm of the printing industry, and then explaining some potential arguments against the Kindle, and then showing how the Kindle's downsides are still preferable to traditional printing.
5. After an analysis of a number of studies on the publishing and e-reader industries, we predict that, on average, the carbon emitted in the lifecycle of a Kindle is fully offset after the first year of use. Any additional years of use result in net carbon savings, equivalent to an average of 168 kg of CO<sub>2</sub> per year (the emissions produced in the manufacture and distribution of 22.5 books). There are additional savings in toxic emissions from publishing and water usage that we haven't quantified. Multiplied by millions of units and increased sales of e-books, e-readers will have a staggering impact on improving the sustainability and environmental impact on one of the world's most polluting industries: the publishing of books, newspapers and magazines. The average textbook results in the emission of 10.2 kg of CO<sub>2</sub>, more than double that of a typical softcover book.
6. The argument and evidence in this text support my work as it proves that there are serious environmental benefits to digital books,
7. Specifically, I used the figures on both carbon emissions and paper waste in landfills and water.